

Trip Report: Summaries of Selected Subcommittee Meetings at the NFRC Annual Spring Meeting, Snowbird, UT, April 23-27, 2002

A. W. Czanderna, Consultant for the National Renewable Energy Laboratory

The author attended Subcommittee (SC) meetings and the Technical Committee (TC) meeting of the NFRC held at Snowbird, UT on April 24 (all SC meetings) and April 25, 2002 (the TC meeting) as summarized below. I did not stay for the Board of Directors Meeting on April 27, 2002. The attachments are available from the SC chairmen. In all meetings, the attendees were informed about NFRC anti-trust reminders, voting requirements, the importance of signing the attendance sheet, and who the Chair had appointed to serve as the recording secretary. The minutes of the prior meeting of each SC or the TC were also approved as distributed or after making minor corrections. Because of the way NFRC staff scheduled the meetings for the morning of April 24, the author did not attend the meetings of the U-factor SC or the Optical Properties SC because they were scheduled as parallel sessions with SCs the author attended.

General Information about NFRC. The Documents, Technical Procedures, and Draft Procedures under development cited in this report are available on the NFRC website <http://www.nfrc.org/documents.html>. The documents available include Technical Procedures, NFRC 100 (1997), NFRC 100 Section B, NFRC 100-SB, NFRC 200, NFRC 201, NFRC 300, NFRC 400, and NFRC Test Procedure (1997). Procedures Under Development include NFRC 101 Draft Document #3, Proposed NFRC size table for NFRC 100, and NFRC Glossary Draft Document. The procedures are related to the various SCs as follows: U-factor (100, 101, Test Procedure), Solar Heat Gain (200 and 201), Optical Properties (300), and Air Leakage (400). NFRC documents for Condensation Resistance (500) and Annual Energy Performance (901) are in the development stages. Other valuable information is also available, e.g. resources on the home page includes links to software (RESFEN, THERM, FRAME, and WINDOW), energy star, the efficient windows collaborative, and the buildings code assistance project.

Long-term Energy Performance (LTEP) SC. The Chair, Carl Wagus, AAMA, Suite 4, 1827 Walden Office Square, Schaumburg, IL 60173-4268 called the LTEP SC meeting to order at 0800 h. The written minutes of the meeting held on January 17, 2002 at Atlantic City, NJ were approved as distributed. Because of a change in his responsibilities at AAMA, the Chair announced that Jack Cole (jackc@jeld-wen.com), Caradco, 201 Evans Road, Rantoul, IL 61866 would replace him as Chair of the LTEP SC. The Chair reviewed the recent history of the activities of the LTEP SC and the goals of the “research project” involving a matrix of 24 products and the tests to be used. Since the January meeting, the remaining 7 test specimens needed to complete the matrix had been promised for delivery to the testing laboratory. Sergio Rucci, who works with Sam Yuan of the Environmental Testing Corp. (ETC), reported on the progress to date on 18 of the 24 products received by them according to the approved schedule of pressure, temperature, and motion cycling. (The 33-step test procedure entitled “Environmental and Ergonomic Exposure Testing Program” and a listing of the 24 products being tested will be made available on the NFRC website). Before and after testing, the products are subjected to analysis of their physical characteristics, e.g., the dimensions of sash, panel, and frame and weather stripping, and visible damage resulting from the tests, e.g., at corners, joints, PVC welds, sealants, glazings, and hardware. The 18 products received by the ETC will be completely tested

by the end of July 2002. If the remaining 6 products are received in time, all products will be tested by October 2002. However, delays from this date may result if the need for the thermal test chamber is too great to meet demands from their paying clients. J. Benney, NFRC Staff, is monitoring the progress by ETC.

Bill Lingnell, Lingnell Consulting, provided an update on the DOE-supported work on IGU durability. DOE funded a project at Aspen Research to provide a knowledge base about IGU durability and information about this project is available at www.igdurability.umn.edu including the composition of the NREL-appointed Oversight Committee. He reported that the recently approved ASTM E 2188, E 2189, and E 2190 standards will be available from ASTM at the end of May 2002. These standards are the harmonized insulating glass standards (HIGS) that provide the same standard of testing IGUs in the United States and Canada. Lingnell cited a project at Body-cote that is using the Sparklight tester for determining the percentage of argon in the cavities of IGUs. For European standards, Andre Piers is keeping the oversight committee informed about the development of standards in Europe. Lingnell stated that IGMA, NFRC, and the European Standards do not require the same information about the manufacturer, location, and date of manufacture. Complete information is deemed essential for tracing the causes of failure in field-deployed IGUs. Finally, the work in progress through IEA Task 27 (<http://www.iea-shc-task27.org> and click on subtask C; subtask B deals with durability methodology development, the durability of electrochromic windows, and other solar collectors) was cited.

At the May 2001 meeting, the Chair outlined possible paths for future SC activity. Additions to the Chair's possible paths were made at the SC meetings in November 2001 and January 2002 (see the LTEP SC sections of the May 2001, November 2001, and January 2002 Trip Reports, which are posted on the website (<http://www.nrel.gov/buildings/windows/>). A discussion of future activities for LTEP SC was postponed to a later meeting because of time limitations and the change in leadership. The incoming Chair was asked to include the LTEP mission statement at the bottom of all future agendas. The meeting was adjourned at 0900 h.

Solar Heat Gain (SHG) SC. The Chair, Ross McCluney, FSEC (407-638-1414), called the meeting to order at 0902 h. The Chair announced his resignation to be effective at the end of the 2002 Annual Spring meeting; Valerie Block (valpgmc@comcast.net) will replace him at the next meeting. The principal items of Old Business were to effect resolutions of the recommended revisions to selected paragraphs in NFRC 200 (Solar Heat Gain Procedure) and NFRC 201 (Solar Heat Gain *Test* Procedure). No negatives were returned for NFRC 200 and the SC approved minor editorial changes requested by J. Hayden, G. Blad, C. Wagus, and D. Arasteh. The vote on the ballot of NFRC 201 contained a negative by W. DuPont in addition to several other requested editorial changes. The negative by DuPont was resolved by the SC agreeing through a series of votes to deleting several sections that are redundant with NFRC 200, inserting phrases for clarification, inserting several sentences that were omitted in the ballot document, and adopting other recommended editorial revisions. A motion to recommend to the Technical Committee the adoption of NFRC 200 and 201, both as revised, was approved (19-0-0).

McCluney distributed a document entitled "Suggested Methodologies for Determining the SHGC of Complex Fenestration Systems for NFRC Ratings." In a previous meeting he had

summarized the problem of dealing with “non-simple” types of glazing systems for which the SHGC cannot be calculated using WINDOWS 5. Copies of the document are available by contacting the Chair. Because of time limitations, two documents prepared by Rebecca Powles (RCPowles@lbl.gov) could not be discussed, but will be attached to the minutes of the meeting. They are entitled “Draft Procedure for Calculating SHGC and VT of Applied Films on Reference Products,” and “Window Attachments Standard Strategy.” Copies may be obtained by contacting Ms. Powles. The meeting was adjourned at 1025 h.

Annual Energy Performance (AEP) SC. The Chair, Dariush Arasteh, LBNL called the meeting to order at 1030 h. In November 2001, the AEP SC resolved issues raised during the ballot of NFRC 901 entitled “Guidelines to Estimate Fenestration Annual Energy Performance in Single Family Residences.” He also stated that NFRC 901 is a guideline, and not a procedure for determining some property as are most other NFRC technical documents, e.g., NFRC 100, 200, 300, 400, and 500. However, the NFRC BOD (a) has delayed adopting the 901 document until the assumptions made in RESFEN can be validated and (b) asked that the AEP not pursue the activity of securing and AEP rating for windows. The request in (b) is a major redirection of the AEP, which worked on developing an AEP rating for about ten years. The goal of the meeting was to propose how the SC should respond to (a) and (b).

The Chair summarized the purpose of the AEP and provided a historical perspective of the initial goal for the SC. The past purpose of the AEP SC has been to integrate the effects of the U-factor, SHGC, and air leakage in specific environmental conditions to model the AEP of representative buildings. Building energy simulators routinely determine an AEP for custom-made buildings, but this has never been done in the U.S. as part of a rating system. The AEP clearly depends on the climate and application, and the AEP SC was focused on providing ratings for a “non-professional” audience. Most clients are not interested in making the whole building calculations as performed by RESFEN, and are not satisfied with the over simplification of DOE’s Energy Star Program.

The Chair then provided a historical perspective of the SC for the (1) early 1990s, (2) mid-1990s, and (3) late 1990s. For (1), the focus was discussing the issues, understanding the limitations of modeling by using DOE 2.1, and defining the important parameters, e.g., climate, window properties, and the properties of a “standard” house. In the mid-1990s, an initial database of results was obtained for 10 climates and 12 types of windows, which ranged from an energy-wasting single glazing to triple glazings with double low emissivity coatings and inert gas fills. Statistics were used to develop a heating rating (HR) and cooling rating (CR) for each product for each different climate. The U-factor, SHGC, and air leakage (AL) were used to calculate the HRs and CRs. The HR and CR ratings yielded good technical information, but the BOD insisted that the ratings were not user friendly. (Authors’ comment: the NFRC really meant that you cannot trust the consumer to make good decisions based on having the quantitative information and that certain manufacturers would be placed at a competitive disadvantage). Thus, the HR and CR rating proposal was shelved in 1996-97 and additional work was begun to consider the effects of shading, no shading, and the area of windows facing north, south, east, and west in the standard building. For (3), the AEP SC agreed on revised assumptions, and documented the modeling issues and databases that now include 52 climates and 14 types of windows. The new results were discussed at length in the AEP SC and then published in an ASHRAE paper, which

will be made available on the LBL website (www.windows.lbl.gov/res_perf/Default.htm) or can be obtained from D. Arasteh. For the current issues in the AEP SC, the efforts are directed at answering the question “What do the consumers really want?” (See AEP SC in the May 2001 Trip Report). Again, the NFRC struggle is between accuracy (desired by the technical people) and simplicity (desired by the manufacturers and the BOD). Carl Wagus of AAMA stated that only a small percentage of those who contact him will access RESFEN, but that most of the others are not satisfied with the Energy Star rating system. What is needed is a rating system that is between the two present extremes. The Chair indicated that market research showed that most consumers do not understand U-factor, SHGC, and AL. The mixed signals from the consumer results in a considerable disjoint. Although many consumers really want to have an analysis of their individual houses, especially for replacing existing windows, they show little interest in becoming informed about the major issues involved in an AEP calculation.

Returning to requests (a) and (b) made by the BOD to the AEP SC, issue (a) was resolved by a motion (Adopted 21-1-6) to submit NFRC 901 for a concurrent SC/TC ballot to secure any additional negatives or editorial changes in the document that was approved in November 2001. For (b), a motion was adopted (28-1-1) to form a task group (TG) to develop a simpler web-based guidance tool for consumers. The purpose of the tool will be to provide the consumer with an interactive rating tool that is considerably better than the energy star ratings but will not require understanding all the parameters used in the RESFEN calculation. About ten SC members volunteered to serve on the TG. The meeting was adjourned at 1205 h.

Keynote Speech. Frank Thompson, Chairman of the National Association of Home Builders' Construction, Codes and Standards Committee and President of Sweetwater Builders in Pittsburgh, delivered the keynote speech from 1310 to 1340 h. NAHB recently endorsed NFRC-certification process. He made five essential points about energy efficient windows, i.e., (1) make energy codes simple and prescriptive, (2) make energy codes cost effective and affordable, (3) encourage innovations in the market place such as low E coatings, (4) improve the dissemination of information and educate builders and consumers, and (5) encourage voluntary energy efficiency programs and the use of tax incentives. Examples were given to support his points.

Research (R) SC. The Chair, Joe Hayden, Pella Corp. (JAHayden@pella.com) called the R SC to order at 1345 h on April 24. After the usual preliminaries, nearly the entire meeting was devoted to the old business of reporting on the status of currently funded or proposed projects. A summary of these is given in Appendix 1. For the NFRC meeting in Girdwood Alaska, Steve Selkowitz will provide a summary of DOE-funded R&D on windows. The meeting was adjourned at 1555 h.

Certification Policy Committee (CPC). The Chair, John Hogan, called the CPC to order at 1600 h. An NFRC staff member placed the author on the agenda by mistake but he attended the first 15 minutes of the meeting to accommodate the needs of the Chair. The Chair reviewed recent actions by the CPC. The author summarized the recent activities of the several organizations that are engaged in durability testing of IGUs and the groups that are preparing standard test methods. Bill Lingnell then addressed the topic erroneously assigned to the author, i.e., certification of IGUs. Lingnell recommended that NFRC develop a formal policy of asking for certification by a

third party. IGMA, AAMA, and other organizations already have adopted and implemented a policy of using an independent third part for certification of products. He then summarized the procedures used by these organizations and referred to the recent paper at IGMA by Carl Wagus.

Condensation Resistance (CR) SC. The Chair, Jeff Baker, WESTLab, called the CR SC to order at 1615 h. The major item on the agenda was resolution of the ballot for an NFRC 500 Users Guide, which had been distributed for comments in March 2002. The Chair apologized for permitting distribution of the wrong version of the revised Users Guide. As a result, a large number of negative votes and comments were received. Mr. Baker stated that he will address all negative issues and editorial comments raised when he prepares a revised version of the NFRC 500 Users Guide. The revised version of the NFRC 500 Users Guide will be submitted for a new ballot as soon as possible. The meeting was adjourned at about 1625 h.

Air Leakage (AL) SC. This SC did not meet.

Technical Committee (TC). The Chair, J. Larsen, Cardinal IG (952-229-2609) called the TC meeting to order at 0800 h on April 25. A quorum was established from a roll call of the voting members. The approved actions by the TC and important parts of reports to the TC are summarized for each SC in the order of presentation. Discussion of the reasons for each needed action is given in the SC summaries. No report was given for the Air Leakage SC and Comfort SC.

For the AEP SC, D. Arasteh moved (Approved) that the TC approves the SC recommendations to reballot NFRC 901 and to establish a task group for improving RESFEN. Using a power point presentation, Robin Mitchell demonstrated the capabilities of RESFEN 5.0. For the CR SC, J. Baker announced that a new ballot is necessary for the NFRC 500 User Guide. For the LTEP SC, C. Wagus announced that the “research project” of accelerated testing of the complete matrix of 24 different door and window specimens is scheduled for completion in October 2002. For the Optical Properties (OP) SC, M. Rubin reported one two-part negative was received by the SC from the NFRC 300 ballot, but that the SC did not propose remedial action. The Chair asked that the SC resolve the issues and bring a recommendation to the TC at the October 2002 meeting. From the ballot of NFRC 302, the issue of verification of measurements was referred to the Certification SC. At the end of the TC meeting, Nittler moved that the TC approve NFRC 300 with the addition of a paragraph to allow for using other measuring techniques than that specified by the cited ASTM standard and that wording used in NFRC 300 (97), which permits exceptions to the ASTM standard, be incorporated into the newest version of NFRC 300 (Adopted 13-3-12). For the R SC, J. Hayden moved that TC approve the SC recommendation to fund the project entitled “Tubular Skylight Solar Heat Gain Standard Project” with David deBlock as the principal investigator and forward the recommendation to the BOD for approval of the funding requested. (Adopted 25-1-9). For the SHG SC, a motion was adopted (28-1-2) that the TC approve the SC recommendation to accept the editorial revisions in NFRC 200 and forward the recommendation to the BOD for their consideration. A second motion was adopted (24-0-4) that the TC approves the SC recommendation to accept the SC-approved revisions in NFRC 201 and forward the recommendation to the BOD for their consideration. For the future of the SHG SC and OP SC, the Chair announced that the OP SC will become a task group in the SHG SC. For the U-factor SC, M. Falke moved that the TC approve the SC recommendation

that a “double-joist, wood-deck with a Celotex light well interior diffusing lens” be rated by the skylight task group and forward the recommendation to the BOD for their consideration. (Adopted 24-0-7). M. Falke moved that the TC approve the SC recommendation that “THERM 5 is an acceptable tool for use in the NFRC 200, 300, and 500 procedures” and forward the recommendation to the BOD for their consideration. (Adopted 27-0-2). The meeting was adjourned at 1003 h.

Appendix I—Status of Research Committee Projects (April 24, 2002)

- a. **Research Manual**—has been approved by BOD and implemented as of 1/1/02. It is published and is posted on the NFRC website under Documents.
- b. **Skylight Performance at Various Angles from the Vertical: Status of Peer Reviewed Papers from Two Projects**—W. DuPont recommended that Sam Yuan write an RFP to analyze the data and prepare the papers; DuPont and the Chair will take action before June 1.
- c. **NFRC 201 Calibration and Comparison Testing RFPs**—the text of ASTM C1363 has been used to propose a new Section 5 for NFRC 201 and will be used for research projects. By June 1, W. DuPont will attach it to an RFP with a summary to explain the differences.
- d. **Effect of Surface Heat Transfer Coefficients on U-Factors for Projecting and Highly Conductive Products**—D. Curcija presented revised timelines for this project in which a first project report will be made by June 3 and the final report will be given on Oct. 2, 2002 at the NFRC Annual Fall Meeting in Girdwood, Alaska.
- e. **3D Heat Transfer Effects in Fenestration Projects**—D. Curcija (reporting for Jeff Baker) presented revised timelines for this project in which a first project letter report will be made by June 17, 2002 and the final report will be given at the NFRC Annual Spring Meeting in 2003.
- f. **Thermal Comfort Rating**—P. Lyon was not present so this action item, which is to form a bid review task group, was deferred to the July meeting of the R SC.
- g. **U-factor Rating of Domed Skylights**—D. Curcija presented a draft RFP that will be revised based on comments made at the meeting. The R SC will vote on the suitability of the project at the July meeting of the R SC.
- h. **Investigation of Heat Transfer Effects of Sloped and Ventilated Internal Cavities of Framing Systems**—D. Curcija presented a draft RFP that will be revised based on comments made at the meeting. The R SC will vote on the suitability of the project at the July meeting of the R SC.
- i. **Publication of Two Papers in ASHRAE**—the final drafts of two papers, which have been received by B. Crooks, will be reviewed by five NFRC members of the R SC and then submitted to ASHRAE for their peer review prior to the January 2003 ASHRAE meeting. The papers treat methods for obtaining the SHGC of (i) glass blocks and (ii) window attachments.
- j. **Thermocouple Shielding**—W. DuPont determined that this potential project is no longer needed, so it was deleted from future agenda of the R SC.
- k. **U-factor Rating of Tubular Daylighting Devices (TDD)**—W. DuPont recommended that Sam Yuan not present an RFP at this meeting. He advised Sam to divide the project into two parts. Clarification is needed and the Chair will contact Sam Yuan before a draft RFP is prepared.
- l. **Tubular Skylight Solar Heat Gain Standard Project**—David deBlock discussed the summary page and statement of work for this task that he delivered to NFRC on 2/15/02. The objective of the project is to determine the solar heat gain coefficient and visual transmittance based on optical modeling and calculations for complex TDD. The R SC resolved (10-0-5) to approve the project as presented and asked the TC for a positive recommendation to the NFRC BOD for the \$40 k of funding.
- m. **Other Old Business. Board Appointed Task Group to Address Research Concerns**—the BOD will appoint a TG at a future date as part of their strategic planning program.